DEC - 2 2011

K110701

510(k) Summary

This summary of the 510(k) safety and effectiveness information is being submitted in accordance with the requirements of SMDA 1900 and CFR 807.92.

Date:	30 November 2011
Submitter:	DNA Genotek Inc. 2 Beaverbrook Road, Ottawa, Ontario K2K 1L1 Canada
Contact:	Chantal Hemens-Davis Vice President Operations, Quality & Regulatory Affairs (Official Correspondent) Tel: (613) 723-5757 Ext. 238, Fax: (613) 368-4628 Email: chantal.hemens-davis@dnagenotek.com
Device Proprietary Names	Oragene®•Dx *Formats: OGD-500, OGD-575, OXD-525, OYD-500*
Common names	Kit for collection of Human DNA, Saliva kit, Sample collection kit
Regulatory Classification	Regulation: 21CFR 862.1675 Panel: Chemistry (75) Classification: Class II Product Code: OYJ DNA Specimen Collection, Saliva
Predicate Device	Vacutainer® Brand PPT™ Plasma Preparation Tube (k972075)

DEVICE DESCRIPTION

The Oragene·Dx family of products offers reliable collection, stabilization, transportation and long-term room temperature storage of human DNA from saliva. Oragene·Dx is a non-invasive alternative for collecting high quality and quantity DNA for use in molecular diagnostic applications. All formats consist of a collection tube, stabilizing liquid and optional sponges for assisted collection. After saliva is collected, the stabilizing liquid is mixed with the sample. Saliva can be delivered directly by spitting or using provided sponges to transfer saliva into the device.

DNA Stabilization, Transportation and Storage

Upon contacting saliva cells, the stabilizing liquid lyses cellular and nuclear membranes to release and stabilize nucleic acids (DNA). Samples can be immediately processed, transported or stored for future use. Oragene·Dx samples are stable at room temperature for up to 12 months. Device and sample integrity are preserved during typical ambient transport and storage conditions.

Sample Processing and Testing

DNA extraction from Oragene·Dx can be performed using alcohol precipitation for the purpose of molecular diagnostic applications.

Intended Use

Oragene·Dx is intended for use in the non-invasive collection of saliva samples. DNA from the saliva sample is isolated, stabilized, and suitable for use in FDA cleared molecular diagnostic applications. Saliva may be collected by spitting directly into the Oragene·Dx container or may be transferred into the Oragene·Dx container using a sponge. Saliva samples collected using Oragene·Dx are stabilized and can be transported and/or stored long term at ambient conditions.

Indications for Use

See "Intended Use", above.

COMPARISON TO MATERIAL AND TECHNOLOGICAL FEATURES OF THE PREDICATE DEVICE

The following table outlines the similarities and differences between Vacutainer® Brand PPT™ Plasma Preparation Tube (predicate) and Oragene·Dx Collection devices.

Table 25 – Similarities between Predicate and Oragene·Dx

Principle, Materials and Technology	Vacutainer® Brand PPT™ Plasma Preparation Tube	Oragene·Dx	Similar	Different
Description of Intended Use	The Vacutainer® Brand PPT™ Plasma Preparation Tube with EDTA anticoagulant and a gel barrier material are evacuated blood collection tubes which provide a means of collecting, processing and transporting blood in a closed plastic tube. When the Tube is used together with Vacutainer® Brand Needles and Holders, it is a closed system for the collection of venous blood with the same indications identified here. Blood collected in a tube containing EDTA anticoagulant and gel barrier material is used primarily to provide undiluted plasma for use in molecular diagnostic test methods including but not limited to PCR (Polymerase Chain Reaction) and bDNA (branched DNA). The specimen may also be used for other testing that requires and undiluted plasma sample as determined by the laboratory.	Oragene·Dx is intended for use in the non-invasive collection of saliva samples. DNA from the saliva sample is isolated, stabilized, and suitable for use in FDA cleared molecular diagnostic applications. Saliva may be collected by spitting directly into the Oragene·Dx container or may be transferred into the Oragene·Dx container using a sponge. Saliva samples collected using Oragene·Dx are stabilized and can be transported and/or stored long term at ambient conditions.	X	
Analyte	Various (including DNA)	DNA	X	
Sample collection	Biological samples collected through venous puncture into a sterile plastic evacuated collection tube	Non-invasive collection of biological samples delivered into a non-sterile plastic collection tube		X
Formats	Multiple	Multiple	X	
Tube material	Plastic	Plastic	X	
Sample source	Venous blood	Human saliva		X
Additive	EDTA and gel barrier material	Nucleic acid stabilization solution		X

Principle, Materials and Technology	Vacutainer® Brand PPT™ Plasma Preparation Tube	Oragene·Dx	Similar	Different
Transport and Stability	Store unfilled tubes at 4-25°C. Limited excursion temperatures up to 40°C, for a cumulative time not to exceed 10 days, are acceptable. Whole blood may be stored in the BD PPT™ Tube up to six (6) hours prior to centrifugation.	Pre-collection Oragene·Dx kits can be transported at temperatures ranging from -20°C to 50°C Post-collection Oragene·Dx samples can be transported at temperatures ranging from -20°C to 50°C Pre-collection Oragene·Dx kits can be stored at room temperature for up to 24 months Post-collection Oragene·Dx samples can be stored at room temperature for up to 12 months (OGD-500, OGD-575, OYD-500) and 3 months for OXD-525		X
Suitability for use with molecular diagnostic applications	Used for testing plasma in molecular diagnostics.	Stabilized DNA can be used in molecular diagnostic testing.	X	

Substantial Equivalence Discussion

The similarities in intended use, materials, technological characteristics show that Oragene·Dx is *substantially equivalent* to Vacutainer® Brand PPT™ Plasma Preparation Tube. The differences tabulated above do not affect the safety and performance of Oragene·Dx. Oragene·Dx performance has been validated using GenMark Diagnostics' FDA cleared eSensor® Warfarin Sensitivity Saliva Test.

PERFORMANCE CHARACTERISTICS

Performance Characteristics of Oragene·Dx by Format

The DNA concentration and total sample DNA yield was determined by fluorescence and the A260/A280 ratio was determined by UV absorbance. These parameters were evaluated across all formats (OGD-500, OGD-575, OXD-525 and OYD-500). Data from a total of 450 samples from 245 unique donors is used in support of the performance characteristics for OGD-500. A subset of 45 donors is used in support of the performance characteristics for OXD-525 and OYD-500. A subset of 43 donors is used in support of the performance characteristics for OGD-575. All samples were extracted using an alcohol precipitation method. Downstream performance was demonstrated on the eSensor® Warfarin Sensitivity Saliva Test.

Table 26 – Summary of DNA Yield Concentration and A260/A280 Ratio Results for Oragene·Dx Performance Characteristics

		OGD-500	OGD-575	OXD-525	OYD-500
Samples Tested		450	43	45	45
Yield (µg)	Mean ± SD	58.52 ± 47.02	13.50 ± 8.84	50.10 ± 42.38	56.05 ± 46.84
	Median	48.44	10.96	33.35	37.28
	95% of samples	≥ 13.1	≥ 3.8	≥ 14.8	≥ 13.0
Concentration (ng/µL)	Mean ± SD	68.11 ± 55.27	41.12 ± 24.59	88.89 ± 74.51	65.38 ± 55.94
	Median	55.27	33.20	60.22	42.11
	95% of samples	≥ 16.0	≥ 11.2	≥ 27.6	≥ 14.8
A260/A280 ratio	Mean ± SD	1.7 ± 0.1	1.7 ± 0.1	1.7 ± 0.1	1.7 ± 0.1
	Median	1.7	1.7	1.7	1.7
	98% of samples	1.5 – 2.0	1.5 – 1.9	1.5 – 1.9	1.5 – 1.9

Table 27 – Summary of eSensor® Warfarin Sensitivity Saliva Test Results for Oragene·Dx Format Comparison

Format	SNP	Samples tested	Correct calls	Incorrect calls	No-calls	% Correct calls
OGD-500	2C9*2	45	45	0	0	100%
	2C9*3	45	45	0	0	100%
	VKORC1	45	45	0	0	100%
OGD-575	2C9*2	43	40	0	3[†]	93.0%
	2C9*3	43	40	0	3[†]	93.0%
	VKORC1	43	40	0	3[†]	93.0%
OXD-525	2C9*2	45	45	0	0	100%
	2C9*3	45	45	0	0	100%
	VKORC1	45	45	0	0	100%
OYD-500	2C9*2	45	45	0	0	100%
	2C9*3	45	45	0	0	100%
	VKORC1	45	45	0	0	100%
After re-test						
OGD-575	2C9*2	43	43	0	0	100%
	2C9*3	43	43	0	0	100%
	VKORC1	43	43	0	0	100%

[†] First-pass no-call results were due to eSensor® control failures.

SAMPLE VOLUME TOLERANCE

A total of 240 samples were collected using OGD-500 with modified "fill to" lines (the volume of stabilizing liquid was kept constant at 2 mL in each of the devices) in order to simulate both under and over spitting. Collected sample volumes ranged from as low as 0.58 mL of saliva to as much as 3.64 mL of saliva with a median collection volume of 2 mL.

As expected the DNA yield was dependent on collected volume and neither the A260/A280 ratio nor performance was affected by under or over spitting. All samples contained sufficient DNA with sufficient quality to be used on the eSensor® Warfarin Sensitivity Saliva Test. All 240 samples gave a correct call after re-testing.

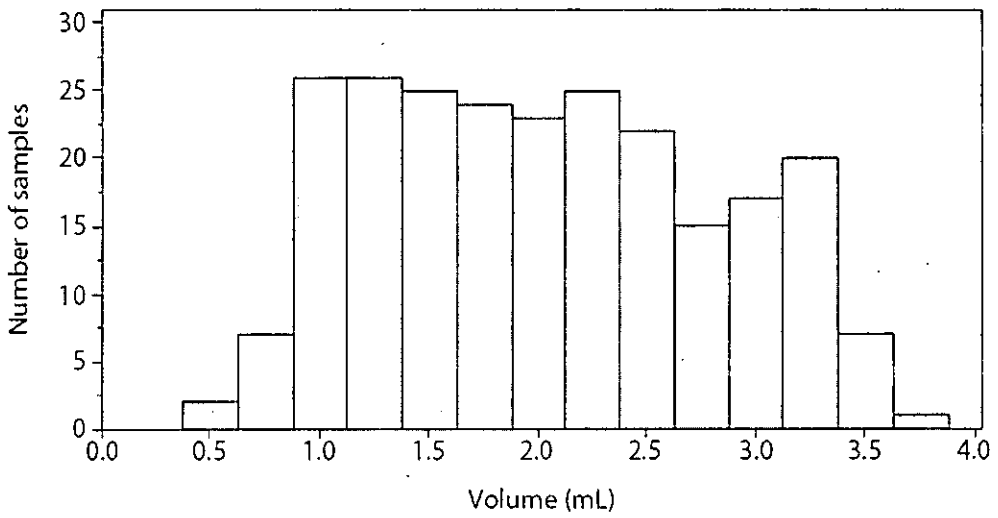

Figure **1** – Collected Saliva Volume in Sample Volume Tolerance Study

Table 28 – Summary of eSensor® Warfarin Sensitivity Saliva Test Results After Re-testing for Sample Volume Tolerance Study

Range of collected saliva volume (mL)	Samples tested	Correct calls	Incorrect calls	No-calls*	% Correct calls
0.58 – 3.64	240	240	0	0	100%

* One first-pass no-call which was resolved upon re-testing.

REPRODUCIBILITY

The OGD-500 device reproducibility study was conducted at three sites (two external and one internal). Three samples (collected using three lots of OGD-500) from each of ten donors, covering all possible genotypes for three alleles for the eSensor® Warfarin Sensitivity Saliva Test, were tested in triplicate by four different operators at the three sites. Each operator extracted DNA from each sample using the same alcohol precipitation method, followed by determination of DNA concentration and A260/A280 ratio for all samples by an independent operator at one of the sites. Four operators at three sites tested the extracted DNA samples on the eSensor® Warfarin Sensitivity Saliva Test. The following table summarizes the yield, DNA concentration and A260/A280 ratio results obtained by four operators at the three sites.

Table 29 – Summary of Device Reproducibility DNA Concentration, Yield and A260/A280 Results

		Operator 1	Operator 2	Operator 3	Operator 4	Combined
Samples tested		87*	87*	90	90	354
Yield (µg)	Mean ± SD	74.89 ± 68.00	76.68 ± 61.76	69.59 ± 57.24	77.40 ± 68.36	74.62 ± 63.79
	Median	57.31	66.32	60.95	57.62	60.39
	95% of samples	≥ 23.23	≥ 26.56	≥ 18.13	≥ 26.02	≥ 23.47
Concentration (ng/µL)	Mean ± SD	86.76 ± 84.43	87.84 ± 70.76	80.21 ± 67.78	90.20 ± 86.69	86.24 ± 77.61
	Median	63.83	74.43	68.82	66.20	68.58
	95% of samples	≥ 25.87	≥ 29.58	≥ 20.42	≥ 28.98	≥ 26.74
A_{260}/A_{280}	Mean ± SD	1.9 ± 0.1	1.8 ± 0.1	1.9 ± 0.1	1.8 ± 0.1	1.9 ± 0.1
	Median	1.9	1.8	1.9	1.8	1.9
	95% of samples	1.6 – 2.3	1.6 – 2.1	1.7 – 2.0	1.5 – 2.0	1.6 – 2.2

* One sample [3 aliquots] from a donor was excluded due to failure to meet incoming study screening criteria.

Table 30 – Summary of eSensor® Warfarin Sensitivity Saliva Test Results for Device Reproducibility Study Stratified by Site and Operator

First-pass

Site	Operator	SNP	Samples tested	Correct calls	Incorrect calls	No-calls[‡]	% Correct calls
Site 1	Operator 1	2C9*2	87	86	0	1	98.9%
		2C9*3	87	86	0	1	98.9%
		VKOR	87	86	0	1	98.9%
	Operator 2	2C9*2	87	86	0	1	98.9%
		2C9*3	87	86	0	1	98.9%
		VKOR	87	86	0	1	98.9%
Site 2	Operator 3	2C9*2	90	87	1[†]	2	96.7%
		2C9*3	90	88	0	2	97.8%
		VKOR	90	87	1[†]	2	96.7%
Site 3	Operator 4	2C9*2	90	43	0	47	47.8%
		2C9*3	90	43	0	47	47.8%
		VKOR	90	43	0	47	47.8%

After re-testing and investigation

	Operator	SNP	Samples tested	Correct calls	Incorrect calls	No-calls	% Correct calls
Site 1	Operator 1	2C9*2	87	87	0	0	100%
		2C9*3	87	87	0	0	100%
		VKOR	87	87	0	0	100%
	Operator 2	2C9*2	87	87	0	0	100%
		2C9*3	87	87	0	0	100%
		VKOR	87	87	0	0	100%
Site 2	Operator 3	2C9*2	90	90	0	0	100%
		2C9*3	90	90	0	0	100%
		VKOR	90	90	0	0	100%
Site 3	Operator 4	2C9*2	90	90	0	0	100%
		2C9*3	90	90	0	0	100%
		VKOR	90	90	0	0	100%

[†] Incorrect call due to operator error resolved upon investigation.

[‡] 46 first-run no-calls were due to two runs (23 samples per run) invalidated due to DNA Contamination Monitor (DCM) failures. The other five first-pass no calls were low signal for the 2C9*2 allele (three), positive control failure (one) and contradictory score at the 2C9*3 allele (one).

STABILITY

Shelf-life conditions were evaluated by storing unused devices (OGD-500, OXD-525 and OYD-500) at room temperature, 6°C ± 4°C or -20°C ± 5°C for up to 24 months. OGD-575 was not tested as the chemistry is identical to the OGD-500 format. Devices were exposed to multiple freeze/thaw cycles of -20°C ± 5°C/50°C ± 5°C. In a separate study, devices were sent by standard mail to donors for collection and the donors mailed their samples directly to the processing laboratories. At all study time points a subset of devices were evaluated for physical and chemical properties to ensure the product specifications remained within acceptable tolerances. Another subset of devices was used to collect saliva from which DNA was extracted and analyzed for yield and A260/A280 ratio.

The data supports shelf-life claims of room temperature storage for up to 24 months. Additionally, the devices may be transported by standard mail at temperatures ranging from -20°C ± 5°C to 50°C ± 5°C.

Post-collection sample stability was evaluated by having 30 donors each self-collect four saliva samples for each Oragene·Dx format (OGD-500, OXD-525 and OYD-500), for a study total of 360 samples. Samples were stored at room temperature, 6°C ± 4°C or -20°C ± 5°C for 12 months or at 50°C ± 5°C for 3 months. At all study time-points, DNA was extracted and analyzed for yield and A260/A280 ratio. Samples stored at room temperature were analyzed for microbial content using a real-time PCR-based assay. A sub-population of samples (564 DNA samples across all time-points) were tested on the eSensor® Warfarin Sensitivity Saliva Test.

The data supports post-collection storage of OGD-500, OGD-575 and OYD-500 at -20°C to room temperature for up to 12 months and at 50°C ± 5°C for 3 months. The data supports post-collection storage of OXD-525 at room temperature for up to 3 months. All formats stored at room temperature for 12 months exhibited no significant change in microbial content.

INTERFERING SUBSTANCES

Both endogenous (amylase, hemoglobin, IgA, total protein) and exogenous (eating, drinking, chewing gum, mouthwash, smoking) potentially interfering substances were added separately to samples from donors with known genotypes. Addition of tested substances had no effect as demonstrated through testing on the eSensor® Warfarin Sensitivity Saliva Test. All samples gave a correct call on first-pass.

CONCLUSION

The submitted information in this premarket notification is complete and supports the safety and effectiveness of the Oragene·Dx family of collection devices.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Food and Drug Administration

10903 New Hampshire Avenue
Silver Spring, MD 20993

DNA Genotek, Inc.
c/o Chantal Hemens-Davis
2 Beaverbrook Road
Ottawa, Ontario K2K 1L1
Canada

DEC - 2 2011

Re: k110701
Trade Name: Oragene•Dx OGD-500, Oragene•Dx OGD-575, Oragene•Dx OXD-525, Oragene•Dx OYD-500
Regulation Number: 21 CFR §862.1675
Regulation Name: Blood specimen collection device
Regulatory Class: Class II
Product Codes: OYJ
Dated: October 24, 2011
Received: October 25, 2011

Dear Ms. Hemens-Davis:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to such additional controls. Existing major regulations affecting your device can be found in Title 21, Code of Federal Regulations (CFR), Parts 800 to 895. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Parts 801 and 809); medical device reporting (reporting of medical device-related adverse events) (21 CFR 803); and good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820).

If you desire specific advice for your device on our labeling regulation (21 CFR Part 801), please contact the Office of *In Vitro* Diagnostic Device Evaluation and Safety at (301) 796-5450. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR Part 807.97). For questions regarding postmarket surveillance, please contact CDRH's Office of Surveillance and Biometric's (OSB's) Division of Postmarket Surveillance at (301) 796-5760. For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to http://www.fda.gov/MedicalDevices/Safety/ReportaProblem/default.htm for the CDRH's Office of Surveillance and Biometrics/Division of Postmarket Surveillance.

You may obtain other general information on your responsibilities under the Act from the Division of Small Manufacturers, International and Consumer Assistance at its toll-free number (800) 638-2041 or (301) 796-5680 or at its Internet address http://www.fda.gov/MedicalDevices/ResourcesforYou/Industry/default.htm.

Sincerely yours,

Courtney H. Lias, Ph.D.
Director
Division of Chemistry and Toxicology
Office of *In Vitro* Diagnostic Device
Evaluation and Safety
Center for Devices and Radiological Health

Enclosure

Indications for Use Form

510(k) Number (if known): k110701

Device Name: Oragene®•Dx Collection Devices: OGD-500; OGD-575; OXD-525; OYD-500

Indications for Use:

Oragene·Dx is intended for use in the non-invasive collection of saliva samples. DNA from the saliva sample is isolated, stabilized, and suitable for use in FDA cleared molecular diagnostic applications. Saliva may be collected by spitting directly into the Oragene·Dx container or may be transferred into the Oragene·Dx container using a sponge. Saliva samples collected using Oragene·Dx are stabilized and can be transported and/or stored long term at ambient conditions.

Prescription Use__X__ (21 CFR Part 801 Subpart D) And/Or Over the Counter Use ___ (21 CFR Part 801 Subpart C)

(PLEASE DO NOT WRITE BELOW THIS LINE; CONTINUE ON ANOTHER PAGE IF NEEDED)

Concurrence of CDRH, Office of In Vitro Diagnostic Device Evaluation and Safety (OIVD)

Division Sign-Off
Office of In Vitro Diagnostic Device
Evaluation and Safety
510(k) K110701